# Anritsu User's Manual

## Using the Anritsu Spectrum Analyzer with *Summit® WMScanner*

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# *1. Overview*

This manual explains how to use the Anritsu MS2711 in conjunction with *Summit® WMScanner*. The Anritsu MS2711 Hand-Held Spectrum Analyzer (HHSA) is a battery-powered, field-operable measurement tool with a real-time serial interface. The Anritsu HHSA is capable of measuring radio signals from 100 kHz to 3 GHz with a measurement range of –90 dBm to +20 dBm. Additionally, the Anritsu HHSA has a power monitor mode whereby an RF detector may be attached to measure specific power levels. Both spectrum analyzer mode and power monitor mode are fully supported within Summit WMScanner, enabling you to record measurement data in real-time for either mode.

The serial interface on the Anritsu HHSA makes it easy for Summit WMScanner to handle all the interaction with the HHSA. All configuration of the HHSA is handled from within Summit WMScanner as discussed below. Summit WMScanner can acquire data from the Anritsu HHSA in real-time, using the specified options. Depending on the sweep configuration, acquiring a single measurement point using the spectrum analyzer mode can take from 3 seconds (for a 0 Hz sweep) to over 30 seconds (for a full 3 GHz sweep). When using the Anritsu HHSA in power monitor mode, measurements can be made much more rapidly, with typical operation permitting over 30 samples a second.

# *2. Recording Real-Time Measurement Data With the Anritsu MS2711 HHSA*

## *2.1 Configure the Anritsu MS2711 HHSA*

Follow the steps outlined below before beginning any measurement run with Summit WMScanner using the Anritsu HHSA:

1. Connect all necessary cables, antennas, and any other accessories to the Anritsu HHSA as desired. For information about such procedures, see the documentation accompanying the Anritsu HHSA. Additionally, connect a null-modem serial cable from the Anritsu HHSA to the PC with Summit WMScanner installed.
2. Toggle the Anritsu HHSA power switch to the ON position.
3. When the system boots, verify that the Anritsu HHSA firmware version is 1.35 or higher. Summit WMScanner does not support Anritsu HHSA models with firmware versions prior to 1.35.
4. After the system has booted, press the Enter key as prompted on the Anritsu HHSA display.
5. To ensure that proper communications will occur with the Anritsu HHSA, place the unit into “Spectrum Analyzer” mode. To do this, press the MODE button under the LCD display, and use the UP/DOWN arrow keys to select “Spectrum Analyzer” mode. **NOTE: Even if power monitor measurements are being made, make sure the Anritsu HHSA is running in Spectrum Analyzer mode.**

## *2.2 Configure Summit WMScanner*

From the Summit WMScanner menu, select "Measurement Survey", "Record New Data…", choose the "Anritsu Site Master / MS2711 / MS2711A / S33XB / S33XC" item from the "Select Measurement Mode" box located at the bottom of the dialog, and then click "Next >>". This will open the Configure Serial Port dialog box shown in Figure 1.

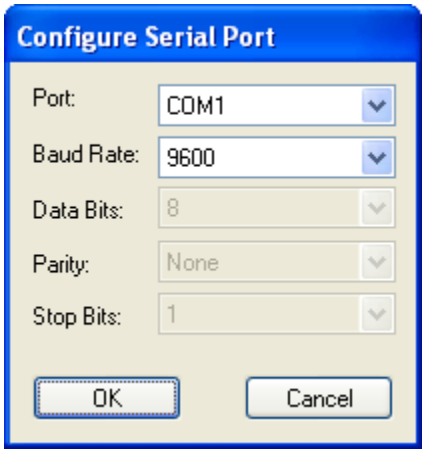


**Figure 1: Configure Serial Port dialog box**

Referring to Figure 1, select the appropriate serial port number where the Anritsu HHSA is attached (e.g., COM1, COM2, etc.) The baud rate should be 9600. The other settings are grayed out because the HHSA does not support any other modes different from those shown in the dialog box. After these have been accomplished, click OK and the Anritsu MS2711 HHSA options dialog box shown in Figure 2 should be presented.

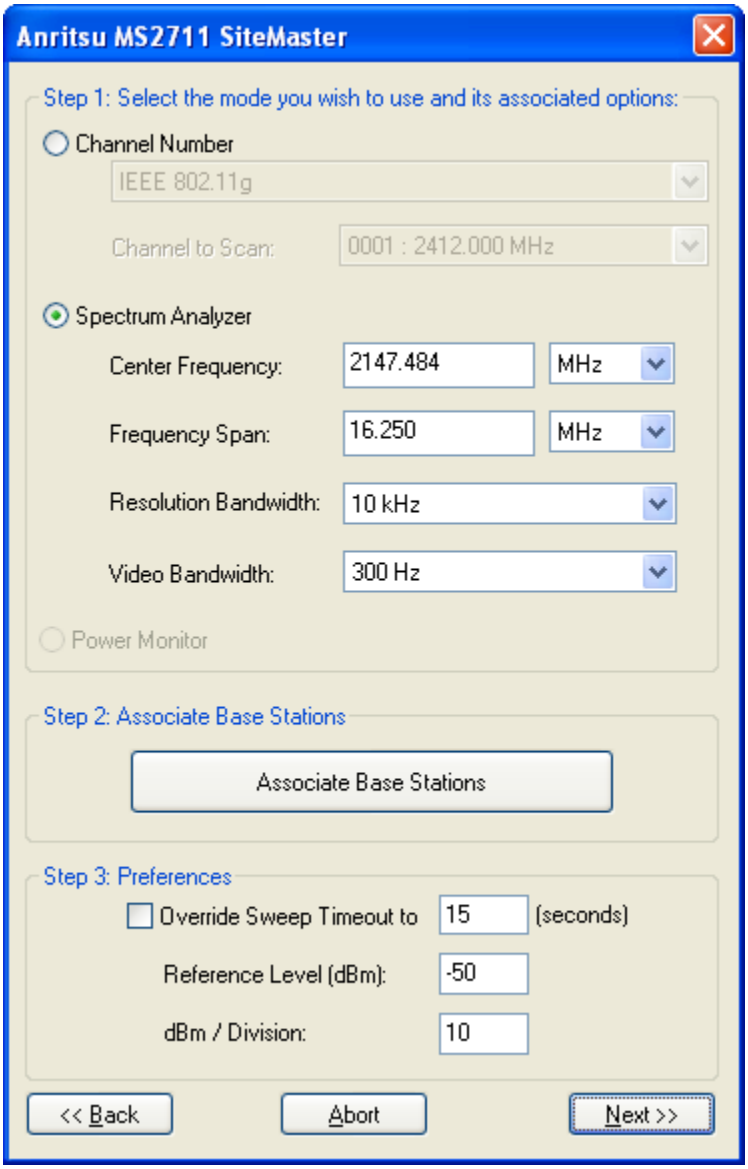


**Figure 2: Anritsu MS2711 HHSA Options Dialog Box**

Referring to Figure 2, follow the steps given below to configure the desired options for collecting data:

1. Select the measurement mode: either Spectrum Analyzer, Channel Number, or Power Monitor.
    - If spectrum analyzer mode was selected, select the desired sweep options. For more information on how to choose these settings, consult the Anritsu MS2711 HHSA User's Guide published by the device manufacturer.
    - Channel Number mode is another way of selecting settings for operating the Anritsu in Spectrum Analyzer mode. Simply select the channel standard and the channel number you wish to monitor.
    - If power monitor mode was selected, make sure an RF detector is

connected to the Anritsu HHSA. If an RF detector is not attached, all measurements will be recorded as –100 dBm.

2. Click the "Associate Base Stations" button to associate measurement data with base stations placed within the current building. Refer to Figure 3 for help in navigating the base station association dialog.
3. If spectrum analyzer mode was chosen in Step 2 above, now choose the desired base station association method. Two options are available.

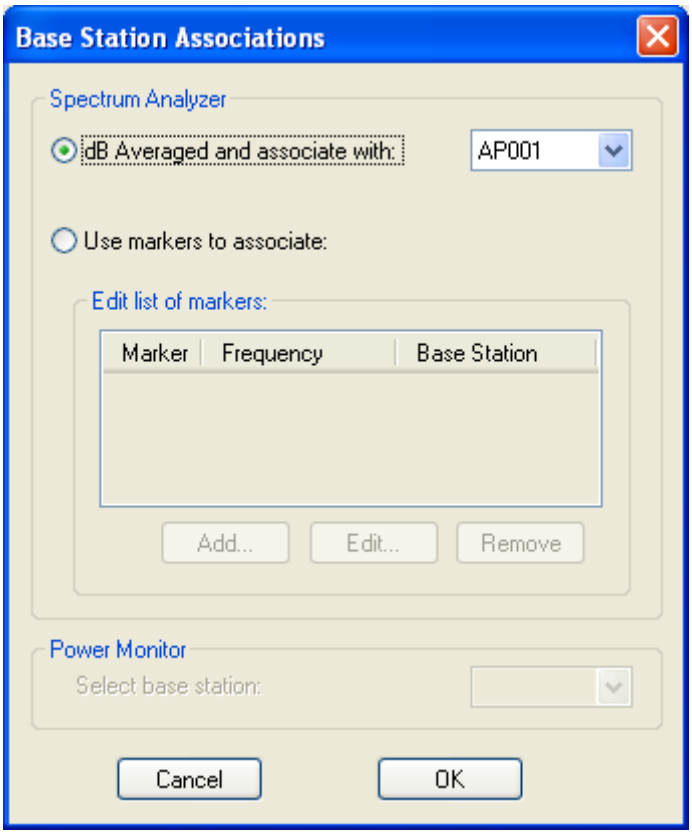


**Figure 3: Base Station Associations Dialog**

a) Using the first option, the entire sweep of data is averaged linearly and the average value is associated with a base station.

b) Using the second option, individual markers can be used to associate unique frequencies with different base stations. **NOTE: In the current version, only one marker may be associated with each base station. If more than one marker is associated with a single base station other post-processing will only choose one marker, potentially causing unforeseen results.**

4. If Power Monitor mode was chosen in Step 1 above, then select the base station to associate measurement data with.
5. Click OK to save the selected base station associations.

Click “Next” to begin collecting data. Refer to Chapter 3 of the Summit WMScanner manual for more detailed instructions on collecting data.

# *3. WVC Anritsu MS2711 HHSA Logfiles*

## *3.1 Overview*

Summit WMScanner positions measurement data based upon an X,Y,Z coordinate system. Since most receiver manufacturers do not support such a data collection scheme, the WVC logfile format was created. The WVC logfile format provides a receiver independent method for collecting and storing measurement data. The WVC logfiles, identifiable by their .wvc file extension, are created by Summit WMScanner automatically during real-time measurement data acquisition and may be very easily imported and exported between different drawings. These files are located in the “measured” subdirectory of the current workspace.

## *3.2 WVC Anritsu MS2711 HHSA Logfile Format*

WVC logfiles created while recording measurements from an Anritsu MS2711 unit are tab-delimited ASCII text files. The logfile consists of two main sections: a Header section and a Data section. The Header section presents basic information regarding the measured data, and is necessary for Summit WMScanner to properly process the logfile when importing the file. The Data section includes the position coordinates, data values, and other information associated with each measurement data point.

### 3.2.1 WVC Anritsu MS2711 HHSA Logfile Header Section

**Version Line [Line 0]**

The initial line of the WVC Logfile is used to indicate the file format version. Currently only one version of the file is supported, version 1. On this and all other lines, the end of line is designated by a standard carriage return/line feed.

**EXAMPLE:**
VERSION: 1

| | **Version Label** | **Version number** |
|---|---|---|
| **Type** | STRING | Integer |
| **Range** | 1 – 128 characters | Only version 1 is supported |
| **Required Field** | Yes | Yes |
| **Example** | Version | 1 |

## Title Line [Line 1]

This next line of the WVC Logfile is the Title Line, and consists of a logfile description, a date of logfile creation, and the drawing name the file was originally created in or exported from, separated by a tab.

**EXAMPLE:**
Extreme Networks Summit WMScanner Measurement Logfile, v.12.0.2 10/19/09 Default_Final.dwg

| | **Logfile Description** | **Date of Creation** |
|---|---|---|
| **Type** | STRING | DATE<br>Month/Day/Year in the form MM/DD/YY. |
| **Range** | 1 – 128 characters | Month: 01 to 12<br>Day: 01 to 31<br>Year: 00 to 99 |
| **Required Field** | Yes | No |
| **Example** | Extreme Networks, Summit WMScanner Measurement Logfile, v.12.0.2 | 10/29/09 |

## Logfile Type [Line 2]

The next line of the Header identifies the type of measurement device of the logfile. This line of the logfile header combined with the version number above, enables Summit WMScanner to recognize the format of the remainder of the logfile. For the WVC logfile created by an Anritsu HHSA, the type of logfile is specified to be "SITEMASTER". It consists of the label "TYPE:" followed by a string field, separated by a tab. For the Anritsu HHSA, this line must appear exactly as follows:

**EXAMPLE:**
TYPE: SITEMASTER

| | **Field Label** | **Type of Logfile** |
|---|---|---|
| **Type** | STRING | STRING |
| **Range** | TYPE: | SITEMASTER |
| **Required Field** | Yes | Yes |
| **Example** | TYPE: | SITEMASTER |

## Measurement Mode [Line 3]

The next line of the Header identifies what mode data was collected using: Spectrum Analyzer or Power Monitor.

**EXAMPLE:**
MODE: Spectrum Analyzer

| | Field Label | Collection mode |
|---|---|---|
| **Type** | STRING | STRING |
| **Range** | TYPE: | {SPECTRUM ANALYZER, POWER MONITOR} |
| **Required Field** | Yes | Yes |
| **Example** | TYPE: | SITEMASTER |

## Optional: Base Station Association Information [Line 3]

If the mode chosen was Spectrum Analyzer, this line additionally indicates the association mode, either by markers or by averaging. There is a tab placed between the end of "Spectrum Analyzer" and the start of "ASSOCIATIONS". This field does not appear under Power Monitor mode.

**EXAMPLE:**
ASSOCIATIONS: MARKERS

| | Field Label | Base Station Association Method |
|---|---|---|
| **Type** | STRING | STRING |
| **Range** | ASSOCIATIONS: | {AVERAGING, MARKERS} |
| **Required Field** | Yes | Yes |
| **Example** | ASSOCIATIONS: | MARKERS |

## Measurement Run Identifier [Line 4]

This line of the Header identifies a unique name for the measurement run. This name is used to differentiate measurement runs that have been read into Summit WMScanner or created by Summit WMScanner. Generally, the name given to the measurement run is the same as the logfile itself. This line of the Header consists of the label "MEASUREMENT RUN:" followed by a string field (alphanumeric characters only), separated by a tab. For the WVC Logfile, this should appear similar to the following:

**EXAMPLE:**
MEASUREMENT RUN: RUN1

| | Field Label | Measurement Data Name |
|---|---|---|
| **Type** | STRING | STRING |
| **Range** | MEASUREMENT RUN: | 1 to 128 alphanumeric characters |
| **Required Field** | Yes | Yes |
| **Example** | MEASUREMENT RUN: | RUN1 |

## Measurement Data Comments [Line 5]

This line of the Header identifies any notes or user comments associated with the measurement data. It consists of the label "NOTES:" followed by a string field separated by a tab. For the Anritsu HHSA WVC Logfile, this line should appear similar to the following:

**EXAMPLE:**
NOTES: Transmitter on third floor, southwest corner

| | Field Label | Measurement Data Notes |
|---|---|---|
| **Type** | STRING | STRING |
| **Range** | NOTES: | 1 to 128 characters |
| **Required Field** | Yes | Yes |
| **Example** | NOTES: | Measuring third and fourth floors |

## Number of Base Station Association Markers [Line 6]

This line of the Header is used to indicate how many markers are used to associate base stations, if any. That is, if a spectrum analyzer sweep is being made and the associations are being made using markers, the sixth line will tell how many markers are being used. If a power monitor measurement is being made, or if a spectrum analyzer sweep is being made using average signal strength for associations, then there are no markers and thus no associations.

**EXAMPLE:**
# ASSOCIATION MARKERS: 2

| | Field Label | Number of Markers |
|---|---|---|
| **Type** | STRING | INTEGER |
| **Range** | # ASSOCIATION MARKERS: | 0 to 32767 |
| **Required Field** | Yes | YES |
| **Example** | # ASSOCIATION MARKERS: | 2 |

### Base Station Associations Header [Line 7]

This line of the Header is used as a column label for the base station associations. It always consists of the text "TRANSMITTER" and optionally the text "FREQUENCY (MHz)". The latter is used only when markers have been used to associate specific frequencies with various base stations.

**EXAMPLE:**
TRANSMITTER FREQUENCY (MHz)

| | Base Station Associations Header |
|---|---|
| **Type** | STRING |
| **Range** | {TRANSMITTER, TRANSMITTER FREQUENCY (MHz)} |
| **Required Field** | Yes |
| **Example** | TRANSMITTER FREQUENCY (MHz) |

### Transmitter Associations [Lines 8-10 (for this example)]

In this example, there are 3 base station associations. Therefore, this section consists of the eighth line through the tenth line. These lines of data consist of the base station name and the frequency associated with that base station. The base station name is a string and the frequency is a floating-point number with a single digit of precision after the decimal. If no associations have been made, then the base station name is "NOT ASSIGNED". If power monitor mode has been used or if no markers have been used to associate data, then the frequency column will not appear.

**EXAMPLE:**
Tx1 2412.3
Tx2 2420.1
Tx3 2407.8

| | BASE STATION NAME | FREQUENCY |
|---|---|---|
| **Type** | STRING | REAL |
| **Range** | Any valid base station name contained within a drawing. | Floating-point number with precision to 1 decimal place; units are in MHz |
| **Required Field** | Yes | Yes |
| **Units** | NONE | MHz |
| **Example** | Tx1 | 2412.3 |

**Data Heading Line 1 [Line 11]**

Line 11 of the WVC Logfile gives the column headings for the data that follows The end of line is designated by a standard carriage return/line feed. Line 12 is specified as a string of underscore '_' characters.

**EXAMPLE:**
X Y Z MARKER FREQUENCY (Hz) SPAN (Hz) RESOLUTION BW VIDEO BW REFERENCE LEVEL DB DIV NUM POINTS SWEEP (dBm)

| | Data Column Headings |
|---|---|
| **Type** | STRING |
| **Range** | 1 – 128 characters |
| **Required Field** | Yes |
| **Example** | X Y Z MARKER FREQUENCY (Hz) SPAN (Hz) RESOLUTION BW VIDEO BW REFERENCE LEVEL DB DIV NUM POINTS SWEEP (dBm) |

**New Measurement Marker Data [Line 13 and greater]**

Beginning with the thirteenth line of the logfile in this example and continuing through the end of the file, actual measurement data will be found. All information in this section of the file is tab delimited, using a separate row for each measurement marker. The X, Y, and Z locations within the drawing are indicated as the first three floating-point values. The marker number is then given as an integer, and the rest of the data stream follows.

If a spectrum analyzer sweep is being performed, then the settings used on the spectrum analyzer are recorded next, including center frequency, span, resolution bandwidth, video bandwidth, reference level, dB/division, and the number of points

recorded. All frequencies are given in Hz, and the bandwidth settings use an integer index into the list of valid values (see the Anritsu MS2711 user's manual for more information). For all valid sweeps, 400 data points must be recorded. The sweep data follows the aforementioned settings and parameters. Values are given in dBm and stored as floating-point numbers with three digits following the decimal.

If power monitor measurements are being made, there are no settings or parameters to be stored, and so only the power level is recorded. The singular data point is stored in dBm using a float-point representation with three digits following the decimal.

**EXAMPLE:**

```
1893.29 366.44  1.80    1       -72.444
1958.99 338.21  1.80    2       -71.852
2035.55 352.32  1.80    3       -71.804
```

| | **X Coordinate** | **Y Coordinate** | **Z Coordinate** |
|---|---|---|---|
| **Type** | REAL | REAL | REAL |
| **Range** | Floating point number with precision to 2 decimal places; units are in meters | Floating point number with precision to 2 decimal places; units are in meters | Floating point number with precision to 2 decimal places; units are in meters |
| **Units** | METERS | METERS | METERS |
| **Required Field** | Yes | Yes | Yes |
| **Example** | 34.24 | -0.74 | 1.80 |

**Continued:**

| **MARKER NUMBER** | **CENTER FREQUENCY (OPTIONAL)** | **SPAN FREQUENCY (OPTIONAL)** |
|---|---|---|
| INTEGER | INTEGER | INTEGER |
| 1-32767 | 100000 to 3000000000 | 0 and 5000 to 3000000000 |
| | Hz | Hz |
| Yes | Yes in Spectrum Analyzer mode. No in Power Monitor | Yes in Spectrum Analyzer mode. No in Power Monitor |
| 1 | 900000000 | 5000000 |

**Continued:**

| **RESOLUTION BW (OPTIONAL)** | **VIDEO BW (OPTIONAL)** | **REFERENCE LEVEL (OPTIONAL)** |
|---|---|---|
| INTEGER | INTEGER | INTEGER |
| 0-3 | 0-3 | -120000 to 20000 |
| | | Thousandths of dBm |
| Yes in Spectrum Analyzer mode. No in Power Monitor | Yes in Spectrum Analyzer mode. No in Power Monitor | Yes in Spectrum Analyzer mode. No in Power Monitor |
| 1 | 1 | -50000 |

**Continued:**

| **DB/DIV (OPTIONAL)** | **NUM POINTS (OPTIONAL)** | **SWEEP/POWER DATA [MAY BE MORE THAN 1]** |
|---|---|---|
| INTEGER | INTEGER | REAL |
| 2 to 15 | 1-32767 | Floating point number with precision to 3 decimal places |
| | | DBm |
| Yes in Spectrum Analyzer mode. No in Power Monitor | Yes in Spectrum Analyzer mode. No in Power Monitor | Yes |
| 10 | 400 | -67.234 |

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